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CENTRAL INTELLIGENCE AGENCY

REPORT

**INFORMATION REPORT**~~SECRET~~

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The "Malakhit" radar is of recent design.

"Malakhit" radar was said to be adaptable to, and intended for use with, all  
types of anti-aircraft guns.~~SECRET~~

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7.

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[redacted]  
It was designed specifically for anti-aircraft fire-control, and is used in connection with all medium and heavy AA guns in "PVO" defense of major "1st class" cities.

8

[redacted]  
"Malakhit" is definitely mobile

9.

[redacted]  
The complete "Malakhit" AA system consists of a radar and computer installed in a single vehicle, plus electro-mechanical data transmission and indication means for an associated battery.

10.

[redacted]  
It controls one battery only, as compared with the older "SON" radars which service four batteries.

11.

[redacted]  
It was said to be impractical for tactical fire-control.

12.

[redacted]  
"Malakhit" is able to "search" out to 50 km on occasion, but to operate reliably to 28 km.

13.

[redacted]  
The altitude capability of "Malakhit" was stated to be about 10 km for fire-control functioning.

14.

[redacted]  
With "Malakhit", it was said that all computing was done in the radar vehicle itself, with the final data being transmitted by "Selsyn" type electro-mechanical means to the battery position up to some 600 meters away. This was a great improvement over the older "SON" type radar installations, in which "PUAZO" mechanical predictors were situated at each battery position, with the radar information being sent to them from the "SON" point by telephone.

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15.

[redacted]  
Gun-aiming is effected manually, by reference to the "Selsyn" type indicators mentioned above. Thus the elevation, azimuth, and automatic range-setting controls are actuated by the gunners in accordance with the motion of the indicators. In the "SON" system, a telephone operator at each battery calls out the three types of information to the "PUAZO" operators as it arrives. Thus the operator at each battery may call out first, azimuth information, then elevation, etc. The "Malakhit" means of information presentation at the guns is a "polar coordinate" system. The gunners follow, with manual controls, the indications of associated automatically operated (by the radar) dials or drums.

[redacted]  
"Malakhit" has its own computer, and does not use a "PUAZO" at the battery. The "Malakhit" system was believed to be much superior to the older "SON-PUAZO" combinations. In this connection, it was said that the "PUAZO 3" is still widely used, but that its intended successor, "PUAZO 4", was discontinued soon after its introduction in 1948. No radio tubes were ever seen in any of the "PUAZO'S", and no [redacted] possibility of any of the models being electronically operated since "PUAZO'S" are purely mechanical devices.

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[redacted]  
about eleven men were required to operate the "Malakhit" radar and computer, including the gas-electric power supply. In comparison, at least 40 men were required to operate "SON-2" complete with four batteries of four guns each. Two parts of the "SON-2" were to obtain and interpret data at the central location, with additional personnel working at each battery, operating the "PUAZO" computers. As was mentioned previously, the three types of data are telephoned from the "SON" position out to the batteries, where a single telephone operator at each is required to relay the information verbally.

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to the "PUAZC" operators. Since "Malakhit" controls only one battery, forty-four men and four "Malakhits" would be needed to match the four batteries controlled by one "SCN".

17. [redacted]  
"Malakhit, by means of its computer, supplies its own "I." factor.
18. [redacted]  
"Malakhit" was said to be much smaller - more compact - than "SCN" radars.
19. [redacted]  
[redacted] the antenna used with "Malakhit", [redacted] was mounted on the roof of the vehicle containing the apparatus.
20. [redacted]
21. [redacted]  
provision for connection, through transformers, to local power supply systems was included in both "Malakhit" and "SCN" radar installations.
22. [redacted]  
[redacted] a new 57 mm (Bofors type ?) gun which has been developed, produced, and already deployed specifically for use against low-flying jet aircraft. This 57 mm gun incorporates a special fire-direction instrument. The gunner, who sits on the gun-carriage and moves around with it, sights this device visually on the low-flying (under 2000 ft.) aircraft. However, information concerning the general direction from which the aircraft are approaching is also supplied to the gunner from an associated "Malakhit" radar which [redacted] is used for acquisition - search only. 50X1-HUM  
[redacted]  
[redacted] it was transmitted by electro-mechanical (synchro-motor type) means, with a polar-coordinate presentation of some sort.
23. [redacted]  
The aircraft position data, as derived from the visual-tracking instrument sighted by the gunner, was transmitted to a small computer standing nearby. The computer then supplied the actual gun-aiming data to the gun.  
[redacted]  
[redacted] The whole system was very modern and effective, and a great improvement over previous direct-aiming methods. In addition, the importance of the improvement afforded by the use of the associated "Malakhit" radar in the effectiveness of the 57 mm gun should not be overlooked.
24. [redacted]  
[redacted] many of these 57 mm "Malakhit"-gun combinations were deployed in the USSR, and in particular along the Polish border.
25. [redacted]  
The gun was first manufactured in Czechoslovakia, and later in the USSR [redacted]
26. [redacted]  
The range of the gun was 10 km, with altitude operation up to 6 km. The muzzle velocity was 1100 meters/second, with a firing rate of two to three per second.
27. [redacted]

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[redacted] the 57 mm gun would not normally use radar in army ground tactical deployment with troops, unless it were protecting some particularly important point or object such as a bridge.

28.

[redacted] normal operation of the gun with associated radar was for daylight use against low-flying jet aircraft. [redacted] small Sofers usually used tracers.

29.

[redacted] the 57 mm gun and direction device are mobile.

30.

31.

Night-firing anti-aircraft practice took place at Koenigsbruck and Stettin ranges [redacted] firing out to sea. A target was towed 3 km behind slow aircraft (120 meters/second), which generally flew at six km altitude. A "SON-3" radar was used, and gunnery was satisfactory. A sleeve-type target was in use. Note: [redacted] (1), a "SON-2" radar was used; [redacted] small caliber artillery was used; (4), slow-moving aircraft at 2'000 meters altitude, followed by searchlights were used; and (5). [redacted]

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[redacted] pretty good results were obtained by the Soviets during World War II with the "SON-2" radar.

32.

[redacted] the "PRS-3", "RUS", and "REDUT" radar equipments [redacted] are rather old and in some cases obsolete. [redacted] the "SP" radar was a very small, mobile set.

33.

[redacted] a large radar school for the Soviet Army and Air Force exists at Kharkov, and that courses in artillery radar are given there. [redacted] a large new-weapons school, the name of which is "Elektro-Relativnyy Snaryad" ("ERS"), is located at Kharkov.

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34.

[redacted] work on this device, on guided missiles, and on rockets, was being done at a large experimental station somewhere in the Caucasus, possibly near "Maykay", and also [redacted] a special artillery range was situated there. [redacted] some missile firings having occurred at "Maykay" in 1950.

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35.

36.

[redacted] the range-dispersion pattern due to fusing inaccuracies in connection with 35 mm, 90 mm, and 105 mm anti-aircraft fire.

About 100 meters.

37.

[redacted] Leningrad, Moscow, Baku, Sevastopol, and Khabarovsk are the priority cities for air defense attention. Each city has an air defense army consisting of anti-aircraft, fighter aircraft, radar, searchlight, and smoke-screen units.

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Soviet tanks use gyro-stabilized guns - stabilized in pitch but not in roll.

39

An 85 mm anti-aircraft regiment has 96 guns, arranged in 16 batteries.

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